MEMORANDUM ON THE MISSOURI EARTHQUAKE OF APRIL 9, 1917.

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The origin of the earthquake is almost certainly connected with a well-defined fault zone trending in a general northwest-southeast direction, and located about 12 to 15 miles southwest of Sainte Genevieve. The course of this fault zone changes radically at a point about 3 miles south-southeast of Weingarten. Northwest of this point the zone trends N. 35°–40° W., but east of the point it swings to the east and follows a S. 85° E. direction for at least 10 miles, beyond which it again follows a more southerly course.

An appreciable movement along any portion of this fault zone should produce vibrations most intense along the fault zone (omitting differences in the character of the rocks involved) and growing less at a distance from the fault zone. A map on which are plotted isoseismals should therefore show a roughly elliptical area, the longer axis of which would be approximately parallel to the fault zone and dependent for its length upon the distance over which movement took place. (All fault movements die out at some point.)

The longer axis of the elliptical area outlined on the isoseismal map [published in this REVIEW, April, 1917, p. 188] trends, however, slightly east of north, and not northwesterly, as might be expected considering the trend of the fault zone. This may be due to several causes. An isoseismal map can be used to discover the locus of earth movement or cause of the disturbance only in a most general way unless the geologic structure and material of the general region and of the particular place from which the data are derived be taken into consideration.

Areas of semiconsolidated or wholly loose material, such as flood-plain deposits or very recent geologic formations, are subject to more intense vibration than older consolidated formations and massive igneous rocks. It is therefore not surprising that the generalized isoseismals in the figure referred to do not reveal a relationship to the northwest trending fault zone mentioned above. Isoseismals drawn on complete geologic maps, where abundant records are available, bring out to an astonishing degree the dependence of relative shock upon geologic structure and material. (Note the San Francisco earthquake data.)

In the case under consideration, the flood-plain deposits of the Mississippi in the southern part of the area have served to increase intensity of shock in this direction, and thus masked the relation of disturbance to the fault zone. More abundant and more evenly distributed records on the northwest quarter would probably have corrected the apparent disagreement in this portion of the area. The extension of the No. V intensity eastward to Vienna is probably an expression of the relation of shock to the easterly trending fault zone. Moreover, the fault zone under consideration is a most irregular one, characterized by many short branching and intersecting faults, permitting movement to take place within restricted areas. Thus, intensities might vary along the fault in a most irregular manner, complicating the interpretation of the data for an isoseismal map. Such seems to be the nature of the data on hand.